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WHAT TO AVOID IN CYCLING.

BY SIR BENJAMIN WARD RICHARDSON, M. D., F. R. S.

IT HAS been my lot for so long a series of years to be concerned in the art and practice of cycling that the various effects of it, good and bad, have become with me a matter of common observation. I feel as conversant with the details as if they formed a part of my professional life, and this fact enables me to speak with a certain degree of confidence, which is strengthened by the circumstance that I have no kind of prejudices bearing upon the subject. Cycling came before me in the first place in what may be called an accidental manner. I had been presiding at a sanitary congress held at Leamington, in the county of Warwick; the first held in England in which matters relating to health alone were introduced. Connected with this congress was a large sanitary exhibition; and amongst the exhibits there were a few bicycles and one of the first machines manufactured in this country in the shape of a tricycle. This tricycle was worked by what was called lever movement; the pedal, now so universal, not having been then applied to tricycles. The late Sir Edwin Chadwick, one of the Vice-Presidents of the congress, who, though far advanced in life, was as alert as a schoolboy on all inventions that presented novelty and that affected the health of the body, had his attention called to this new machine. Greatly struck by it and by the good work that could be done upon it, he promised to bring me next day to see it in action, and so, accompanied by a large number of the council of the congress, I went with him and had the whole thing explained to me by the exhibitor. Seeing that movement upon it was comparatively simple, I had the machine brought out to an asphalt passage leading to the main road, and straightway mounted it. The attendants were prompt in their efforts to prevent my sustaining injury from the venture. But

all idea of danger rapidly disappeared, and I very soon ran away from my protectors, reached the main road, which lay at a right angle from the asphalt passage, proceeded a good half mile on my own account, and returned in triumph, to the great delight of the lookers-on. From that day until now I have been a cyclist. I very soon had a machine of my own, choosing what was called a "Rob Roy," in which the levers were replaced by pedals, a very nice instrument, which had, however, the misfortune of being what is called a "single-driver"; that is to say, progression upon it was by the work of one wheel. Then followed the "Salvo," in which machine the late Mr. Starley, of Coventry, got over the difficulty of the single wheel by the compensation process, and turned out a really admirable instrument, one of which kind I rode for several years with great comfort and safety, and which, in fact, I still retain. It was a very heavy machine, weighing about 120 pounds. The wheels were unnecessarily high and the gearing was low, but, nevertheless, I got on with it, climbing the hills with great ease, and, as the brake was perfect, went down hills with a rapidity and safety that could not easily be excelled. Later on I followed the various improvements of machines using two trackers.

My experience has all been, personally, with the tricycle, but my observation has extended also to bicycles through the experiences of those who have been my companions, for very soon I found companionship in cycling more than in any other pastime, and it is from such experiences, together with my own, that I write what is subjoined.

From the first my impressions have been always in favor of cycling, and, to some extent, the expression of that favor on certain public occasions has, I think, helped to popularize the movement. I believe the exercise has been of the greatest service to large numbers of people. It has made them use their limbs; it has called out good mental qualities, and it has taken away from close rooms, courts and streets, hundreds of thousands of persons who would otherwise never have had the opportunity of getting into the fresh air and seeing the verdant fields and woods, the lakes and rivers, and the splendid scenery that adorn our land. This is all in favor of the cycle, the bicycle or tricycle, but I have yet more to say in the same direction. I am bound to indicate from direct observation that cycling has been

useful in the cure of some diseases and that it is always carried on with advantage, even when there is a marked disease. I have seen it do a great deal of good to persons suffering from fatty disease of the heart, from gout, from dyspepsia, from varicose veins, from melancholia, from failure due to age, from some forms of heart disease, from intermittent pulse and palpitation, and distinctly from anemia. Moreover, I have known persons who could not have been expected to ride without danger get on extremely well in their riding, and have often, with due precautions, given permission to ride even to some patients to whom five and twenty years ago I should have forbidden every kind of exercise. These truths I have proclaimed publicly without any hesitation, and sometimes to the wonder of friends who still held views which I had been compelled to discard.

But now it is my duty to speak on the other side and to report such experience as yields evidence of dangers from cycling. I shall speak on this point as explicitly as is necessary.

There are dangers from cycling. The first is the danger of teaching the practice to subjects who are too young. Properly, cycling should not be carried on with any ardor while the body is undergoing its development—while the skeleton, that is to say, is as yet imperfectly developed. The skeleton is not completely matured until twenty-one years of life have been given to it. The cartilaginous structures have to be transformed into true osseous structures before the body can be said to be naturally perfected. If it be pressed into too rapid exercise while it is undergoing its growth it is the easiest thing in the world to make the growth premature, or even to cause a deformity. The spinal column is particularly apt to be injured by too early riding, and the exquisite curve of the spinal column, which gives to that column when it is natural such easy and graceful attitudes for standing erect, stooping, and bending, is too often distorted by its rigidity or want of resiliency. When that is the case the limbs share in the injury. They do not properly support the trunk of the body, and pedestrian exercise, thereupon, becomes clumsy, irregular, and ungraceful. We see these errors particularly well marked in the young, now that the cross-bar system of the cycle has come so generally into use. The tendency in riding is for the body to bend forward so as to bring itself almost into the curve of the front wheel, and in this position many riders hold themselves for

hours, and the spine more or less permanently assumes the bent position. In plain words, the column becomes distorted, and through the whole life affects the movements of the body.

There are further injuries done to the youth, male or female, through other organs of the body and especially through the heart. Dr. Kolb, as well as myself, has found that it is the heart which is principally exercised during cycling. So soon as brisk cycling has commenced the motions of the heart begin to increase. In this respect cycling differs from many other exercises. Rowing tells most on the breathing organs; dumb-bells and other exercises where the muscles are moved without progression of the body, tell most on the muscles; whilst in climbing and long pedestrian feats it is the nervous system that is most given to suffer. There is not a cycle rider of any age in whom the heart is not influenced so as to do more work, and although in skilled cyclists and trained cyclists a certain balance is set up which equalizes the motion, such riders are not exempt from danger. I have known the beats of the heart to rise from 80 to 200 in the minute, in the first exercise of riding, an increase which, for the time, more than doubles the amount of work done—a very serious fact when we remember that the extreme natural motion of the heart allows it to perform a task equal to raising not less than 122 foot-tons in the course of 24 hours, that is to say, over 5 foot-tons an hour. In the young we may apply the same argument to the heart as we have done to the skeleton; the heart is undergoing its development, and it is an organ which cannot without danger be whipped on beyond its natural pace. What occurs with it under such circumstances is that it grows larger than it ought to grow, that it works out of harmony with the rest of the body, and is then most easily agitated by influences and impressions acting upon it through the mind. I have many times seen this truth illustrated too plainly, and I doubt whether in the young, after extreme exercise, such as that which arises from a prolonged race, the heart ever comes down to its natural beat for a period of less than three days devoted to repose.

In the young, excessive riding affects unfavorably the muscles of the body generally, as well as the heart, which is itself a muscle. Properly, the muscles go through stages of development just as the skeleton does, and to attain a truly good muscular form all the great groups of muscles ought to be evenly

and systematically exercised. But cycling does not do that ; it develops one set of muscles at the expense of the other. It does not develop the chest muscles properly ; it does not develop the arm muscles properly ; it does not develop the abdominal muscles properly ; it does not essentially develop the muscles of the back ; but it does develop the muscles of the lower limbs, and that out of proportion to all the rest. I have a picture in my mind's eye at this moment of a youth who, when stripped, was actually deformed by the disproportionate size of the muscles of the calf of the leg, and of the forepart of the thigh—an effect which unbalanced the body as a whole, and greatly impaired it for good healthy action.

Lastly, in the young, cycling often tells unfavorably on the nervous function. The brain and nervous system, like skeleton and muscle, have to be slowly nurtured up to maturity, and if they be called upon to do too much while they are in the immature state, if the senses of sight and hearing and touch have to be too much exercised, even though by such exercise danger from collisions may be skilfully averted, perhaps to the admiration of lookers-on, there is a tax put upon those organs which makes them prematurely old and unfitted for the more delicate tasks that have afterwards to be performed.

There are two classes of dangers arising out of overstrain in cycling : the first may be called the extreme, the second the moderate danger. I will take the extreme first. This is shown in those remarkable athletes who enter into competitions such as have never before been dreamed of in the history of the world. The results of such competitions have as yet excited comparatively little notice among men who are specially skilled in estimating their importance, but they convey the strangest intelligence as to the physical capabilities of man. They show that men have been found able to travel, by virtue of their own bodily energy, 400 miles at one effort. They show also that men can be trained to perform this effort without sleep, and that the body can be kept using itself up, as it were, for the long period of 40 hours. Sleep, which the poet tells us “knits up the ravelled sleeve of care, is the balm of hurt minds, and chief nourisher in Life's feast,” sleep, which is the very harbinger of health, is here set aside, with the result of a victory absolutely purposeless, at the expense of the whole body. There has not been, as far as I can ascertain, a single

example of a feat of this kind being accomplished without direct and immediate sign of injury. Finally, when the labor is done there is the period of recovery which lasts for many hours, and is in itself an ordeal which the strongest nature ought never to be subjected to. The result is that these victims of extreme competition last but few years in the ordinary condition of health and strength.

In this criticism is included a summary of the objection which has to be made to record breaking, a kind of absurd effort, the end of which it is very difficult to foresee, for, unfortunately, it may be urged with apparent plausibility that it is good as practice. The enthusiastic cyclists tell us that it is through record breaking that all the great advances have been made. Record breaking, they say, depends upon improvements which take place, not simply in the work of the riders or in those who compete, but also in the development of the machine itself. It has been found, for example, that the lightening of the machine, the reduction of its weight down even to twenty or thirty pounds, has been one of the great achievements. A man put more work originally into a machine weighing, say one hundred and twenty pounds, while doing ten or fifteen miles an hour, than is now put forth on a light machine doing over twenty miles an hour. There is a great deal of truth in this statement, and I fully admit that the record breakers have done service in making cycling, as an art, a remarkable exhibition of human skill and endurance. I have suggested for many years past that the end of these efforts will be a transition to the domain of flight, and that a good flying machine will ultimately come out of the cycle. The cycle, in fact, will develop into the flying machine through the intervention of wings, which will be workable by the power of the individual alone or aided by some very light motor. It is, therefore, with great reluctance, that I protest against the overstrain which I have seen. It is a kind of self-martyrdom to which we may conscientiously give admiration and support.

The second effect of overstrain is rather a forced than a voluntary martyrdom. Those who suffer from it are mostly young persons, often mere boys, who are made to ply the machine, probably heavily loaded, in commercial duties and business. It is astonishing in this metropolis of London what an amount of work a youth can be trained to do. He can really do the work of a

horse, owing to the quantity and weight of goods he can distribute, and the rapidity with which he can get through his task. There is a little ambition about it also, for the young people often like the exercise, and are proud of showing off their skill and energy, while their employers, apprehending no evil from it, let them do as much as ever they can. The result is a greatly expedited circulation in these young laborers and an extreme tension of the heart and arteries, these organs being as yet immature and easily over-expanded under undue pressure. The effects are not immediate, but they lead to enlargement or hypertrophy of the heart and to those derangements of the blood vessels which follow upon dilatation of the arterial circuit. Afterwards, when the maturity is completed and the organs of the body cease to develop, there is a disproportion between the vascular system and the other parts of the body, which means general irregularity of function; a powerful left heart pulsating into a feeble body, and a powerful right heart pulsating into the lungs. The effect must, of necessity, be injurious, and the fact is too well demonstrated in practice. I have seen this enlargement and over-action in so many instances I am convinced that when it is more correctly and widely understood it will be recognized that cycling is one of the causes of "disease from occupation," and that some public steps will have to be taken to limit the danger. But the danger is not always connected with occupation. Many well to do young persons of both sexes, by the enthusiasm and competitive work they throw into the exercise, become affected in a similar manner, and have to be restrained, when that is possible, from too great an indulgence in the pursuit.

In noticing these evils I have proceeded at once to the most important central evil, that which applies to the heart and circulation from overstrain. But there are other phenomena I must not let pass. There is often developed in the cyclist a general vibratory condition of the body which is mischievous and is shown in various acts of movement and thought. There are certain unconscious or semi-unconscious movements of the body which become sensible to the subject himself at particular moments when great steadiness is called for, as, for instance, when sitting for a photograph. There is also shown an over desire for rapidity of motion, as if it were necessary at every moment to overcome time and curtail distance by labor of an extreme degree. Lastly, there

is developed a kind of intoxication of movement which grows on the mind by what it feeds on and keeps the heart under the impression that it is always requiring the stimulation of the exercise. These sensations, it will be said, are entirely "nervous," and under a correct interpretation of the word I perfectly admit that they are so. It is improper, at the same time, to consider that a persistent sensation, or series of sensations, should be disregarded altogether because they are what is called "nervous." A repetition of nervous phenomena produces, in a short time, a habit that is strengthened by craving or desire, like the desire for alcohol and other stimulants when the need is felt of whipping the heart into a greater state of activity. I have long been of opinion that all cravings and impulses, indeed, spring from the heart as from their centre or magazine, and not from an independent brain ; as if, in short, the heart were the mind centre of motive desire and action.

There are some further symptoms observable in many developed men and women who indulge in cycling and which, though they may be minor in degree, should not be neglected. In all long tours carried out by cyclists we meet with these minor developments and I candidly confess that, prudent as I have been in my excursions, I have experienced the symptoms myself. You are out on a bright day skimming along the roads, with everything in favor of the exercise. You have gained your "wind," that is to say, your breathing and circulation are going together in harmony; you have lost the sensation of strain in the front muscles of the thigh; your spirits are exhilarated as you pass along; you do not indulge in spurts but keep steadily at your work, and as the day begins to close you are going so merrily that you actually regret that the journey has come to an end. You dismount for the night: you take, perhaps, a fair supper; you luxuriate in a bath, and you go to bed. But when you get into bed a most provoking thing occurs; you do not sleep; you are kept awake by a constant restlessness of the muscles. The muscles of the lower limbs will not be quiet. They start you up in twitches and if you look at the muscles, especially the muscles in the calves of the legs, you see that they are in motion although you may not feel them. I remember an instance in which the observance of these muscular twitchings created actual alarm to the rider, and I myself counted no less than sixty of them within

the minute. They are muscular motions arising from an over-irritable condition excited by the riding. They may extend even to the muscles of the thighs and they always produce a restless night. Toward the morning the muscles become more composed and a heavy sleep follows, with a weary waking as if the body were as tired on rising as it was on going to bed. Presently, when the muscles are again exercised, the weariness passes away and a repetition of the cycling effort actually, after a time, appears to bring more relief, so that you cycle with the greatest freedom. The continued exercise is, however, no real cure; the phenomena are repeated, and cycling becomes at last a very wearisome pursuit. I have known actual breakdowns from this distressing cause, and I warn all cyclists, but especially those who have attained middle age, to moderate their enthusiasm whenever they find that the motion of cycling long continued produces muscular restlessness and impaired sleep.

The question has often been put to me whether dangers not as yet referred to are induced or increased by the efforts of cycling. Does hernia, or rupture, occur through cycling? I can say fairly I have never known it. Does enlargement of the veins increase through cycling? I can say fairly I have never known it; on the contrary I have, I think, seen a reduction of venous enlargement under the exercise. Does congestion of the brain ever occur, with giddiness or other symptoms referable to the head? I confess I have never known it, and I do not recall an example in which owing to symptoms immediately induced any rider has felt it necessary to dismount from the machine. But there are two things which I have witnessed and which I would like finally to record.

I have known persons of lymphatic and gouty tendency who have taken to cycling and have felt at first great good from it. They have become warm advocates of the pastime and, indulging in it extremely, have suffered from their extreme devotion to it. I have observed that certain of these have become depressed, have lost tone, and have been obliged, peremptorily, to give up the sport they were so fond of. I have also known amongst the gouty a peculiar kind of gout induced by the exercise, and thereupon a dislike to it—a result which is rather unfortunate, as well as unnecessary, because the injury has been brought about by overdoing the thing, and by turning what would be useful into an injurious practice. In conclusion, though, as I have said, severe

head symptoms from cycling are unusual, it is within the range of my experience to have known general injury in nervous subjects brought on by a too great stress of observation in riding, such as is induced by the fear of collision in crowded thoroughfares, too rapid a motion in descending hills, or too severe a trial in overcoming obstacles that caused the danger of a fall. I have even known young people, not bad riders, injured by too great trespass on nervous power, and I certainly would advise all timid riders to avoid tempting Providence too far in trying to show off their ability as against their better trained and cooler companions.

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